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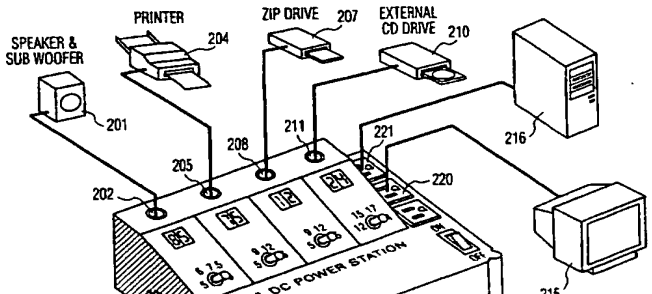
*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: ELECTRICAL POWER STRIP WITH AC TO DC POWER SUPPLY




(57) Abstract: The familiar power strip (200) or uninterruptable power supply (UPS) commonly used with personal computer systems (216) are supplied with an internal AC to DC power supply and a plurality of DC sockets (202, 205, 208, 211) at its face. The DC sockets (202, 205, 208, 211) are connected to the (DC) output of the power supply, via a resistor network, for supplying different DC levels at the sockets and the sockets are configured differently to mate with plugs of specified configuration keyed to the proper DC voltage level. The power supply has an input cable with a plug for connection to an in-the-wall socket and includes AC sockets (220, 221) electrically connected to that cable electrically in parallel to the resistor network for providing AC power at (AC) sockets (220, 221) at the face of the strip. According to another aspect, the UPS is equipped with circuitry which connects between the DC side of the AC/DC converter therein and a plurality of sockets on the face (202, 205, 208, 211) of the UPS for supplying DC voltage there. The UPS also is equipped with two batteries. One battery is connected between the DC side of the AC/DC converter and the DC side of a DC/AC converter both standard in prior art UPS devices. The other battery is connected between the DC side of the AC/DC converter and the DC voltage determining circuitry. The first battery provides back up for AC sockets (220, 211) in the UPS face; the second, back up for the DC sockets (202, 205, 208, 211) should an AC power failure occur. A single battery embodiment is also disclosed.

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equipment is sold with an adapter which plugs into the wall and provides the requisite DC voltage in each instance.

U.S. Patent No. 5,563,782 issued October 8, 1996, describes a multi-socket, in-the-wall outlet which includes an AC to DC convertor and provides sockets for both AC and for DC voltage. The outlet has to be installed in the wall and wired into the house wiring. Further, U.S. Patent No. 5,321,349 describes a battery-powered, portable power supply with a single (switchable) socket for supplying DC power. But neither the in-the-wall outlet nor the portable battery-powered equipment provides a portable, multisocket arrangement which allows the flexibility and ease of use of the familiar power strip.

But the familiar power strip merely provides multiple sockets for supplying like AC voltages. Peripheral equipment requiring different DC voltages still requires an in-the-wall outlet and an adapter.

BRIEF DESCRIPTION OF THE INVENTION

In accordance with the principles of this invention, the familiar power strip for simultaneous activation of a PC and associated monitor, keyboard, printer ---etc, includes an internal (AC to DC) power supply and sockets to which the power supply provides different DC voltages. Consequently, host equipment, such as a PC, can have peripherals, which do not have internal (AC to DC) power supplies, connected to DC sockets in the power strip in the same manner as the presently associated equipment is now connected to a power strip for receiving AC power.

By providing a plug and cable instead of requiring wall installation, a portable universal power strip is provided for convenient use where one need only plug into a

Fig. 9 is a schematic view of a UPS in accordance with the principles of this invention; and

Fig. 10 is a schematic view of an illustrative system employing the UPS of fig. 9.

## DETAILED DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENTS OF THIS INVENTION

Fig. 1 shows a familiar prior art power strip **10**. The power strip includes a plurality of sockets **11**, **12**, **13**, **14**, **15**, **16** and **17**, each of which is a standard wall receptacle for receiving a plug which mates with a wall outlet. The power strip includes a cable **20** and a plug **21** configured to plug into a wall socket. The power strip also includes a switch **22** operative to supply power to each of the sockets.

Fig's. 2a and 2b are top and side views of an illustrative power strip **30** in accordance with the principles of this invention. The power strip includes an elevated portion **31** which houses a plurality (illustratively two) AC (voltage) sockets **32** and **33** and an on-off switch **35**. The AC sockets are connected to a wall socket (not shown) via a cable **36**.

The power strip of fig. 2 also includes a lower portion **40** which includes a plurality of DC voltage sockets in a familiar configuration. The DC sockets illustratively are 3V, 5V, 6V, 7.5V, 6V, 12V, 15V, 17V, and 24V. Two sockets (**42** and **43**) are illustratively of undesignated voltages and two sockets (**45** and **46**) are switchable to one of several voltages 9V, 12V, 15V and 24V for socket **45** and 3V, 5V, 6V, 7.5V, 9V, 12V, and 15V for socket **46**.

implemented by a microprocessor similarly designated in fig. 4. The AC-DC converter (45) is implemented by a standard arrangement of transforms, diodes and capacitors as is well understood. The DC-DC converter similarly is a standard component. The control, feedback and protection functions (46 and 48) are implemented by a microprocessor.

The DC out block 49 of fig. 3 is implemented by a resistor network shown in fig. 5. Specifically, fig. 5 shows lines 55 and 56 connected to switchable sockets 45 and 46, of fig. 2A, respectively. The figure also shows lines 60, 61, and 62 connected to sockets (non switchable) 65, 66, and 67 of fig. 2A. Broken lines 70 and 71 indicate connections to the remaining sockets (non switchable) of fig. 2A. Ground connections for the resistor network are shown at 75, 76, and 77.

The voltage output from EMI filter 42 is rectified by diode bridge 52 with the voltage level determined by capacitor 53 of fig. 4. Control circuit 43 (with protection and reset 44) operates as a voltage regulator and regulates AC-DC converter 45 to generate the specified voltage for the DC-DC converter 47 (along with control circuit 46 with feedback and protection circuit 48).

A set of blocks 46, 47, 48 is necessary for each socket on lower portion 40 of fig. 2a and is shown in fig. 4 illustratively only for a single socket. Specifically, fig. 5 shows two switchable sockets 45 and 46 along with at least three fixed voltage sockets 60, 61, and 62. The circuitry represented by blocks 46, 47, and 48 in fig. 3 is required for each of these sockets.

The outputs of circuits **146**, **147**, and **148** are also connected to inputs to circuits **141**, **142** and **143** as shown.

Dashed line **150** encompasses the components found in prior art UPS devices. The dashed line is shown encompassing the familiar EMI filter **151** as well as plug **152** as shown. The components outside the dashed lines are provided in accordance with the principles of this invention to provide uninterruptible power to DC sockets in the event of a power failure at plug **152**.

Fig. **8** shows an alternative embodiment of this invention using only a single battery **160**. All the components encompassed by dashed line **170** in fig. **8** can be seen to correspond with like components encompassed by dashed line **150** of fig. **7** and, accordingly, are not further designated or discussed herein.

But in the embodiment of fig. **8**, the output of battery **160** is connected to a DC/DC converter **161**. The output of converter **61** is connected to voltage control circuits **164**, **165**, and **166**. The output of circuits **164**, **165** and **166** are connected to current and over voltage protection circuits **168**, **169** and **170**. The outputs of circuits **168**, **169** and **170** are connected to inputs of circuits **164**, **165** and **166** respectively.

The outputs of circuits **168**, **169** and **170** also are connected to DC sockets **172**, **173** and **174**, respectively as shown.

The various components herein may be any such components capable of operating as required and are standard, commercially available items.

Fig. **9** is a schematic view of an operating model **190** of the embodiment of fig. **7** with an extra (a fourth) socket **191**. In addition the model included a plurality of

connected to socket **111** - all DC sockets. Monitor **215** and computer **216** are connected to AC sockets **220** and **221** respectively. The power pier is capable of supplying to many other components such as an external FAX/modem, floppy drive, photo scanners, video camera, wireless phones, label printers, point of sale devices, bar code scanners and credit card readers.

6. A power strip as in claim 5 wherein said plurality of sockets are of like configuration.

7. A power strip as in claim 6 also including a second AC socket connected to said input.

8. A power strip as in claim 5 including means for varying the voltage at at least one of said DC sockets.

9. A power strip as in claim 7 including means for varying the voltage at at least one of said DC sockets.

10. A power strip as in claim 8 including means for varying the voltages at a plurality of said DC sockets.

11. A power strip as in claim 5 wherein said resistor network provides a different voltage at each of said sockets.

12. An uninterruptable power supply, said supply including a connector for connection to a source of AC power and a plurality of first sockets, said supply also including first means for supplying AC voltage at each of said sockets, said means comprising an AC/DC converter and a DC/AC converter and having a first battery connected between the DC sides of said converters, said connector being connected to the AC side of said AC/DC converter and said sockets being connected to the AC side of said DC/AC converter, said supply also including a plurality of second sockets and second means for supplying DC voltages to each of said second sockets.

13. A supply as in claim 12 wherein said second means comprises a DC/DC converter, said DC/DC converter being connected between said first battery and said plurality of second sockets.

plurality of resistor networks, each of said resistor networks being connected to one of said sockets for providing DC voltage there, each of said resistor networks also being connected to the DC side of said AC/DC converter.

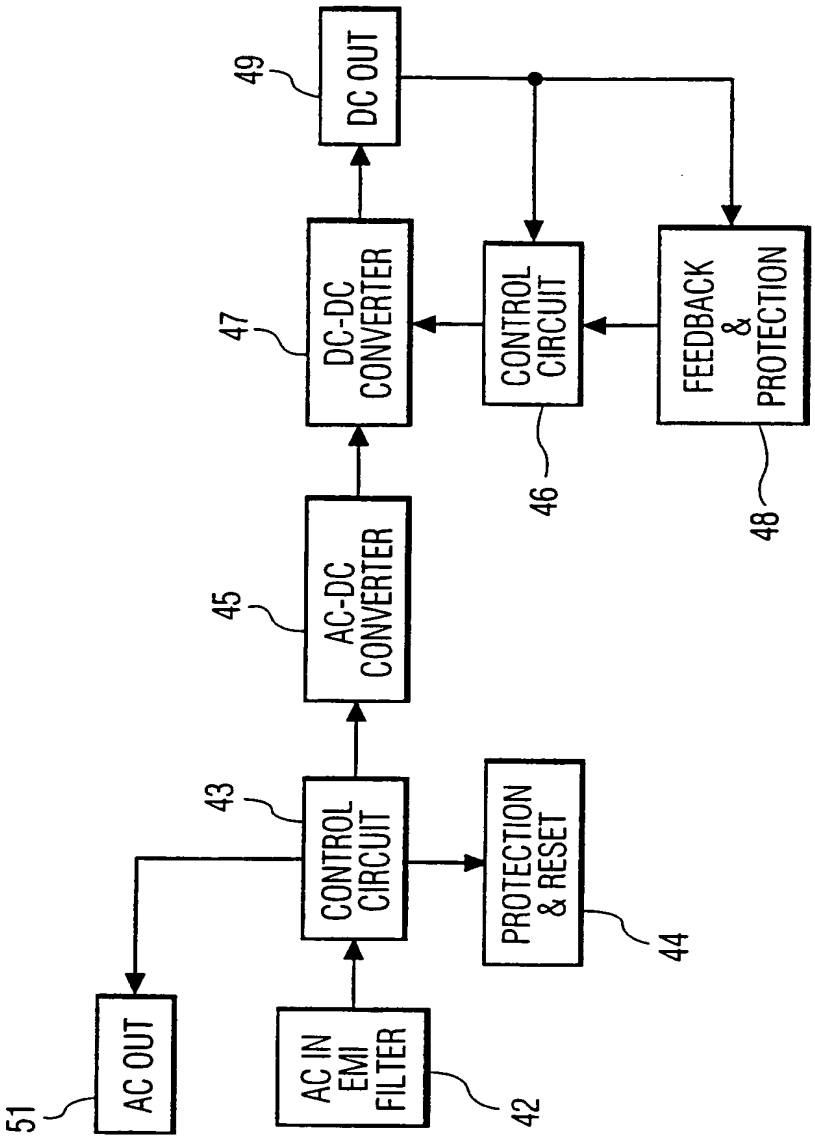


FIG. 3

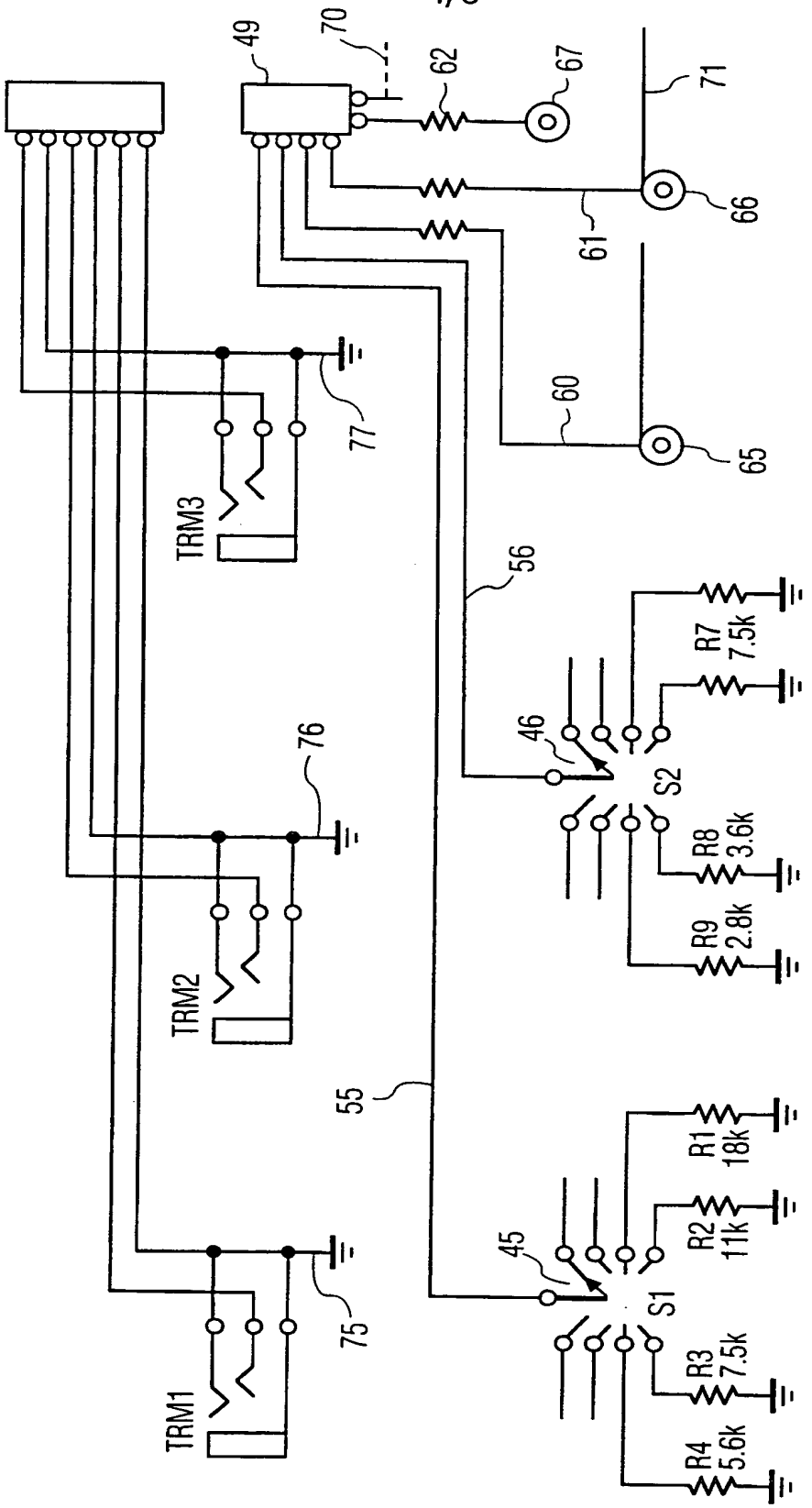


FIG. 5

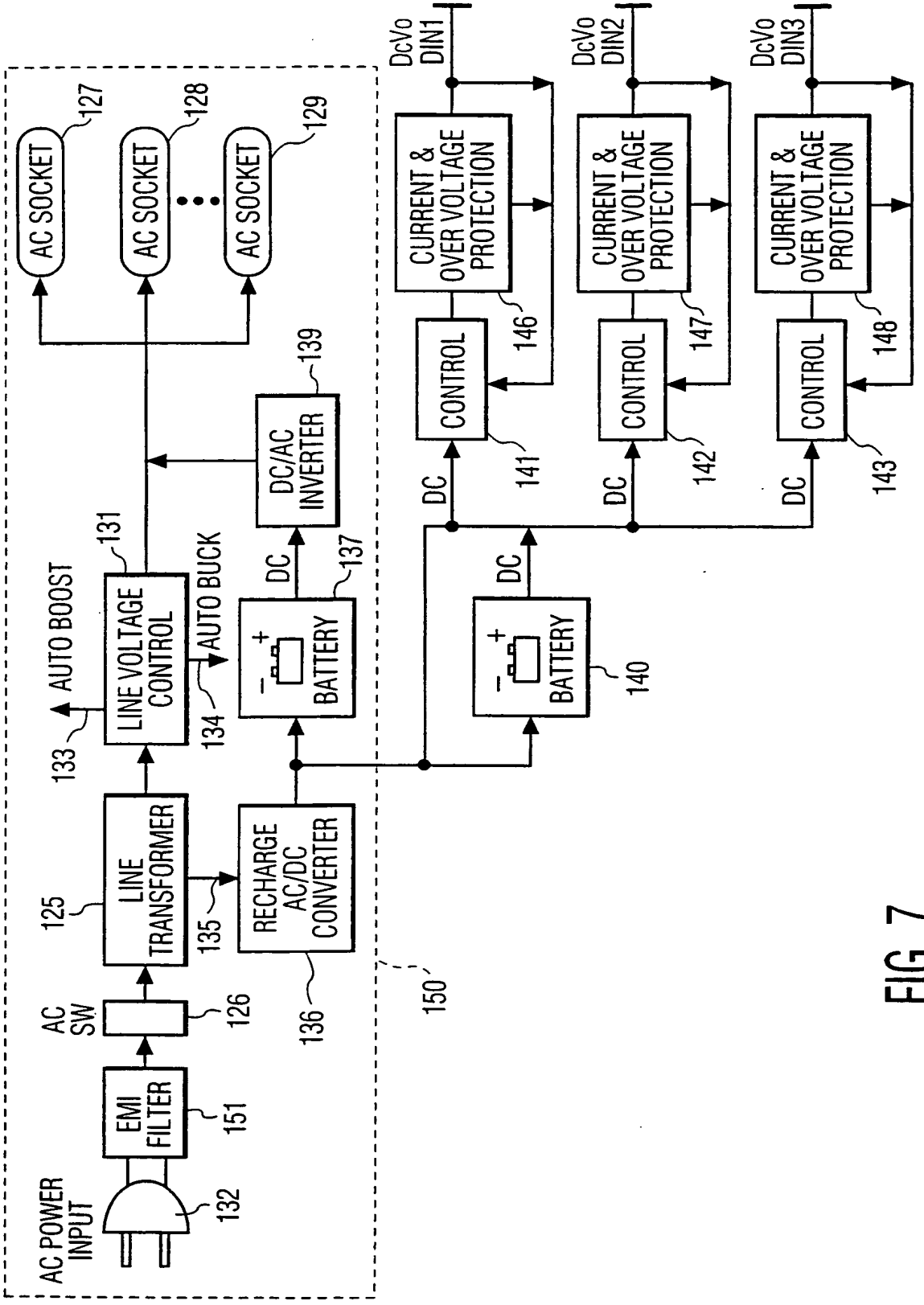


FIG. 7

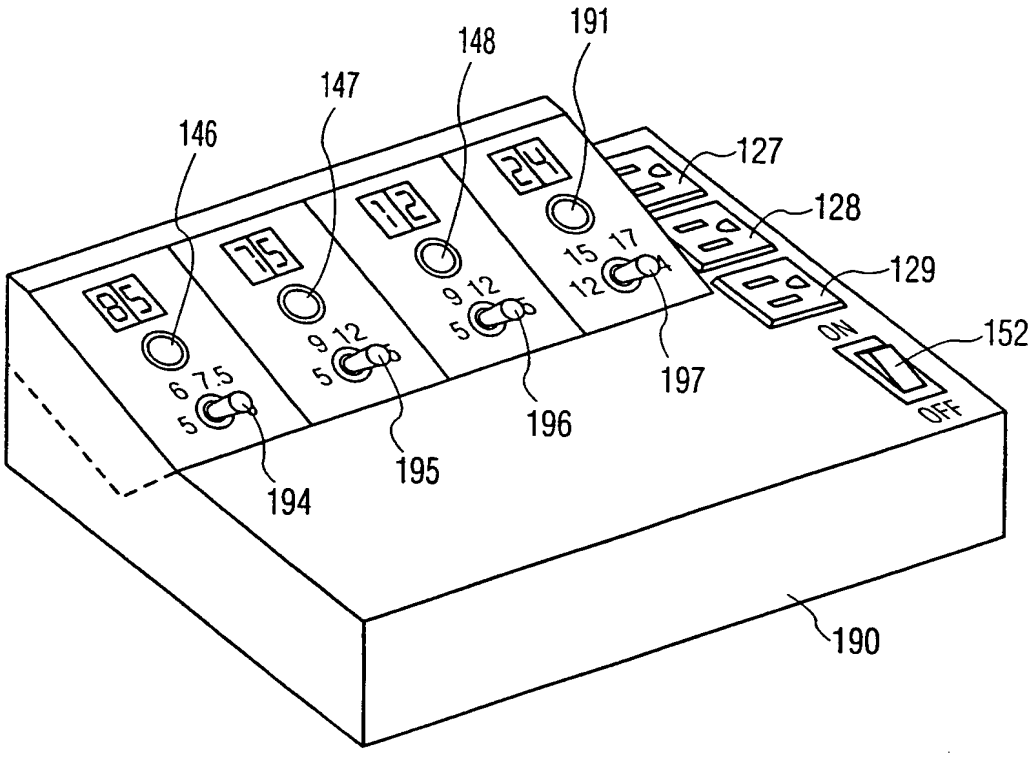


FIG. 9

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29434

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) : H02M 5/42, 1/00
US CL : 363/84, 146
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 363/84, 146; 439/620, 638; H02M 5/42, 1/00; H01R 13/68, 25/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US 5,900,684 [LAM] 04 MAY 1999, (04/05/99) COL. 2, LINES 35-65 | 1-20 |
| Y | US 5,563,782 [CHEN ET AL] 08 OCTOBER 1996, (08/10/96) COL. 3, LINES 1-50 | 1-20 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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| * | Special categories of cited documents: | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
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| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. (703) 305-7723 | Authorized officer<br>GARY L. LAXTON<br>Telephone No. (703) 305-7039 |

Form PCT/ISA/210 (second sheet)(July 1992)*